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INTELLIGENCE MEMORANDUM

Damage of Civilian Structures and
Civilian Casualties in the Hanoi-Haiphong Area
10 April to 22 May 1967Summary

The recent extension of the Rolling Thunder program to include attacks against military and economic targets in the heavily defended and densely populated areas around Hanoi and Haiphong has resulted in surprisingly light damage to civilian structures.

During the period 10 April-22 May strikes against 39 major targets in the Hanoi-Haiphong area and the Thai Nguyen iron and steel complex resulted in the destruction of 216 and damage to 50 civilian structures. Most of these were single-family residences.

Over 60 percent of the structures destroyed were at Yen Vien, the location of a rail classification yard. This yard is a small and extremely narrow target located in the midst of a densely populated area. An unknown amount of this damage was inflicted prior to 10 April 1967.

North Vietnamese propaganda has cited the attacks on these facilities as a savage slaughter of defenseless women and children. Hanoi claims a total of 725 civilian casualties during the period 10 April-20 May 1967. An intelligence assessment based on photography yields an estimate of about 240 casualties in areas where civilian structures were damaged. An additional 100-200 industrial workers may also have been casualties, for a total in the order of 500 casualties. Although the North Vietnamese claim of 725 is not a patent fabrication it should be regarded as a maximum claim.

Most of the damage to civilian structures is the result of bombs missing their targets. Falling shrapnel, malfunctioning SAM's and jettisoned bombs account for only a small share of the damage and civilian casualties.

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I. Air Attacks in the Hanoi/Haiphong Area

Thirty-nine targets of military or economic significance located within or close to Hanoi and Haiphong were attacked during the period 10 April - 22 May 1967. Slightly over 850 tons of ordnance and 569 attack sorties were directed against targets including 13 JCS targets, 5 important non-JCS targets, and 21 SAM sites. During the same period an additional 100 attack sorties were flown in the same area against other pre-planned and armed reconnaissance targets such as bridges, barges, storage areas, and AAA sites. A listing of these targets and the number of missions flown against them is shown in Table 1. A summary of air operations against targets in the Hanoi/Haiphong area for the period 10 April - 22 May is given in the tabulation below.

<u>Type of Target a/</u>	<u>Number of Targets</u>	<u>Attack Sorties</u>	<u>Ordnance (tons)</u>
JCS	13	484	778
Non-JCS	5	35	65
SAM Sites	21	50	10
<u>Total b/</u>	<u>39</u>	<u>569</u>	<u>853</u>

a. Targets struck within 10 nautical mile radii of Hanoi and Haiphong.

b. In addition, there were approximately 100 sorties flown and 180 tons of ordnance delivered against 13 types of other pre-planned or armed reconnaissance targets in the Hanoi-Haiphong vicinity during this period. These targets included bridges, barges, trucks, road and railroad segments, storage areas, military headquarters, causeways, coastal defense points, train, AAA sites, radar sites and supply depots.

Extensive attacks have also taken place against other economic and military targets in the northern route packages of North Vietnam. The important Thai Nguyen Iron and Steel Complex has been subjected to about 240 attack sorties. Post-strike photography of the Thai Nguyen facility has been analyzed to determine the damage that results to worker housing quarters and villages when targets in less heavily populated areas than Hanoi or Haiphong are subject to heavy attack.

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Analysis of available photography of the Hanoi/Haiphong/Thai Nguyen areas reveals damage to civilian buildings at 17 locations.* Most of the damage occurred to single-story housing in heavily built up residential areas close to the targets under attack. The distribution of the damaged civilian structures is shown in the following tabulation:

<u>Location</u>	<u>Civilian Structures</u>		<u>Total</u>
	<u>Destroyed</u>	<u>Damaged</u>	
Haiphong	27	21	48
Hanoi	162	19	181
Thai Nguyen	<u>27</u>	<u>10</u>	<u>37</u>
Total	216	50	266

The amount of damage to civilian structures is surprisingly light in view of the intensity of the attacks on relatively small but heavily defended targets in areas close to civilian housing. During the strikes against the Haiphong Thermal Power Plant West and the adjacent Haiphong Cement Plant, 113 attack sorties delivered 117 tons of ordnance. Excluding target damage, the strikes destroyed 21 and damaged 8 civilian structures -- all located in areas immediately south of these two targets. Ten strikes against 6 other targets in the Haiphong area destroyed only 6 and damaged 13 buildings. An extreme example of damage to civilian structures resulted from attacks in the Yen Vien Railroad Classification Yard which destroyed 135 civilian buildings.

The Yen Vien case is atypical.** Railroad classification yards are small and narrow targets. It is common for residential housing to be in dense clusters immediately adjacent to the tracks so that even the most accurate bombing will hit an inordinately high number of dwellings. The heavy attacks -- 237 sorties, 580 tons of ordnance -- against the sprawling Thai Nguyen Iron and Steel Complex located in relatively isolated country about 35 miles north of Hanoi resulted in 27 buildings destroyed and 10 damaged. The destruction was scattered throughout four sparsely populated areas outside the confines of the Iron and Steel Plant.

* Other instances of isolated civilian damage undoubtedly have occurred, The photography available does, however, cover a major share of the targets recently attacked.

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The Hanoi Thermal Power Plant was attacked on 19 May and again on 21 May by a total of 6 A4E aircraft firing 6 MK-1 Mod 0 Walleye missiles. Preliminary photographic bomb damage assessment shows that one or more Walleyes impacted on the boiler house and that there is no visible damage to civilian structures although the target is surrounded by civilian housing and commercial structures.

A detailed listing of the known damage to civilian structures during the 10 April-22 May period, as confirmed by aerial photography, is given in Table 2.

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III. North Vietnamese Claims

North Vietnamese propaganda statements since the intensification of US air strikes against targets in the Hanoi/Haiphong areas have continued to emphasize the savagery of the bombings and the accompanying slaughter of defenseless women and children. There has, however, been no dramatic change in the shrillness of the North Vietnamese protest nor has there been any obviously gross falsification in their claims of civilian casualties.

The number of casualties as a result of attacks against important economic or military target are never reported. The North Vietnamese reported, for example, that 7 persons were killed and 25 wounded when the Haiphong Enamelware Factory was hit on 20 April but made no mention of casualties at the adjacent Haiphong Thermal Power Plant West, the target that was actually under attack. Schools, hospitals, churches, soap factories, and cigarette factories are, according to the North Vietnamese, the targets of US air attacks. Powerplants, when mentioned at all, are described as public utilities in an obvious attempt to attribute no military value to them. North Vietnamese reporting on damage to civilian areas, also is conspicuously silent on such facts as the close location of these areas to important economic or military targets, or the fact that AAA batteries are frequently located in civilian areas.

A summary of North Vietnamese claims regarding civilian casualties in the Hanoi/Haiphong areas since 12 April is given below:

SECRET/NO FOREIGN DISSEMNorth Vietnamese Claims of Civilian Casualties;*
Hanoi/Haiphong Areas, 10 April - 20 May 1967

<u>Date</u>	<u>Location</u>	<u>Casualties</u>	
		<u>Killed</u>	<u>Wounded</u>
12 April	Haiphong	4	12
20 April	Haiphong	44	117
25 April	Hanoi suburbs	80	120
25 April	Haiphong	20	60
7 May **	Haiphong and Hanoi	80	120
14 May	Hanoi	13	35
19 May	Hanoi	20	N.A.
		<u>261</u>	<u>464</u>

The total of 725 casualties, 261 killed and 464 wounded,** is based on North Vietnam press and radio reports for the period of 10 April to 20 May and excludes casualties that resulted from the 22 May attack on the Hanoi Thermal Power Plant. Some of the North Vietnamese casualty figures undoubtedly include double counting, particularly the casualties occurring in the Hanoi suburbs on 25 April which were totalled from fragmented and probably overlapping reporting. On the other hand, it is possible that some casualties that occurred in outlying districts were not included in the initial North Vietnamese propaganda announcements. North Vietnamese casualty announcements generally agree with respect to date and location with known US air operations.

* In some cases total casualty claims have been apportioned between killed or wounded and non-specific casualty claims have been quantified.

** Reported to have occurred "recently".

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IV. Reliability of North Vietnamese Claims

Estimates of the total number of casualties resulting from specific strikes are difficult to make. Past experience does make it possible, however, to arrive at an approximation of civilian casualties which is useful in putting the North Vietnamese casualty claims in perspective.

Aerial photography of the major JCS targets in the Hanoi-Haiphong-Thai Nguyen area reveals that for the period 20 April 1967-21 May 1967, 266 civilian buildings were destroyed or heavily damaged. However, photographic coverage of the cities is far from complete and some undetected damage probably occurred at other locations. Based on an intensive study of civilian casualties in Nam Dinh, North Vietnam's third largest city, it is estimated that an average of .45 persons are killed for each building destroyed or damaged. Applying this factor to the Hanoi-Haiphong-Thai Nguyen area yields an estimated 120 casualties in areas where civilian structures were damaged. If this estimate were expanded on the basis of the number of attack sorties to include target areas for which no photographic coverage exists, it would increase to about 240 casualties. These estimates of casualties in civilian housing areas do not include casualties which occurred at the 197 industrial/storage buildings which photography confirms were damaged or destroyed. These casualties cannot be estimated precisely because of a lack of data on the number of workers in the buildings, and uncertainties about the amount of prior warning, and the efficacy of shelter provisions. The number of casualties among industrial workers is also dependent upon the type of industrial installation being attacked. The power plants attacked in North Vietnam have small labor forces, probably not more than 100-200 workers in each. The Haiphong Cement Plant, however, has a labor force of 1,500. Railroad repair shops would also be expected to have a relatively large labor force. It would not be unreasonable, therefore, to expect that an additional 200 industrial workers could have been casualties, bringing the total casualty estimate close to 500.

North Vietnam's propagandists can be expected to dramatize the number of casualties reported to foreigners in order to shore up their allegations of "US atrocities." Furthermore, multiple press and radio reportings result in some double counting. Overall, Hanoi's casualty propaganda

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is of mixed reliability. While the statistics on physical damage which appeared in their "Report on US War Crimes in Nam Dinh City" were remarkably accurate when checked against aerial photography other instances have been formed of casualty reports for areas not even attacked by US aircraft. For these reasons, the tally of 725 casualties from North Vietnam sources should be regarded as a maximum.

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V. Cause of Damage and Casualties

Only a small percentage of the civilian casualties that have occurred in North Vietnam can be attributed to the malfunctioning of SAM missiles and AAA shells or falling shrapnel. The major cause of civilian casualties, excluding industrial workers in the target complex, seems to be a result of bombs missing their targets. The jettisoning of bombs and wing tanks and crashing US aircraft undoubtedly also have caused civilian casualties but these causes probably do not account for a significant share of the total.

Several pilots have observed SAM missiles falling back to the ground and detonating. Recently, a pilot attacking the Van Dien Vehicle Depot reported that a missile fell back into an industrial complex, causing a large secondary explosion. There have also been reports of SAM missiles exploding above Hanoi and flaming debris falling on ships in the harbor. Both undetonated anti-aircraft artillery (AAA) projectiles and fragmentation from detonated ones are also known to have caused damage and casualties as they fall back to the ground. Six crewmen aboard the chartered British ship "Dartford" in Haiphong suffered casualties from falling AAA fragments.

The degree to which SAM missiles and AAA are causing damage and casualties in North Vietnam's northern urban areas is most difficult to assess. Because the explosive in an AAA projectile is so small -- the 100-mm projectile weighs only 35 lb -- its effects are not normally recognizable in aerial photography. The effects of the explosion of a SA-2 missile are difficult to distinguish from those of a US 250 or 500 lb bomb. Based on estimated AAA projectile fuse reliability and SA-2 guidance and operating characteristics, however, it is possible to make a limited judgement regarding the levels of damage and casualties.

An estimated 5 percent of the SAM missiles fired which miss their targets could be expected to fail to self-destruct before impacting on the ground. These failures are due to electronic and mechanical malfunctions as well as sloppy firing technique by poorly trained crews. If 5 percent of the SAMs fired over North Vietnam failed to self-destruct, this would represent approximately 15 tons of ordnance, equivalent to only about 9 aircraft bomb loads. Even if 10 percent of the SAMs malfunctioned, the total tonnage equivalent would still be less than one-half of the tonnage dropped on the Haiphong Thermal Power Plant West. In addition, the majority of the missiles would impact in unpopulated areas although the booster section discarded by each SAM missile a few seconds after launch may occasionally fall outside of its intended "safe" impact area, causing fires or casualties.

AAA projectiles which fail to self-destruct after missing their target usually detonate when they fall back to the ground. In doing so, they may cause damage to civilian casualties. Fragmentation from normal air bursts falling back to the ground is also a potential, although even less likely, cause of civilian casualties. The self-destruct fusing on 37 and 57-mm AAA projectiles is virtually 100 percent reliable and that on 85 and 100-mm projectiles is 95 to 96 percent reliable. Eight-five and 100-mm shells are capable of doing some structural damage to lightly constructed buildings and causing casualties. Most of these weapons are located in urban areas, so that it is likely that a major share of the unexploded rounds do fall into inhabited areas. However, the relatively small explosive force of the projectiles greatly limits the probable number of civilian casualties. With the exception of direct hits, typical Hanoi air raid shelters provide adequate protection against these projectiles. Fragmentation from normal air bursts is even less of a problem -- air raid shelters and buildings are capable of protecting their occupants from even direct hits, although exposed personnel in the streets risk injury. It is unlikely that total civilian casualties from SAM and AAA malfunctions and AAA fragmentation since the beginning of the bombing would exceed several hundred.

The cluster bomb unit (CBU), a fragmentation type anti-personnel bomb often used for antiaircraft fire suppression, has been the subject of particularly virulent North Vietnamese propaganda. It is likely that this weapon has been responsible for a substantial number of civilian casualties. Recent strike photography of the Hanoi Transformer Station Dong Anh clearly shows a pattern of CBU explosions "walking through" an area of civilian housing. A French dispatch from Hanoi on 27 April reported, "Several hamlets in the rural district on Dong Anh.....were hit by steel pellet bombs killing about 10 people."

Table 1

Major Targets Struck in the Hanoi-Haiphong Area
10 April-22 May 1967*

JCS No.	Target	Week Beginning						
		April 9	16	23	30	May 7	14	21
	<u>Haiphong Area</u>							
	Haiphong Thermal Power Plant, East		**					
	Haiphong Thermal Power Plant, West		*	**				
	Haiphong Cement Plant			*				
	Haiphong Petroleum Storage			*	*			
	Haiphong Ammo Depot			*				
	Haiphong Kien An Airfield					*	*	
	Loi Don POL Transshipment Point	*					*	
	Tram Bac POL Storage						*	
	<u>Hanoi Area</u>							
	Hanoi Transformer Station			**	*			
	Hanoi Railroad Car Repair Shops, Gia Lam			**				
	Hanoi Railroad/Highway Bridge			**				
	Yen Vien Railroad Classification Yard				*	*		
	Ha Dong Army Barracks/Supply Depot				*	*	*	
	Van Dien Supply/SAM Depot						*	
	Hanoi Thermal Power Plant						*	*
	Nguyen Khe Military Storage						*	
	Kinh No Vehicle Repair						*	
	Bac Mai Motor Pool Facility							*

* This tabulation excludes 21 SAM sites attacked during the period.

Table 2

Known Damage to Civilian Buildings in the
Hanoi/Haiphong/Thai Nguyen Areas,
10 April-22 May 1967

Damaged Area	Extent of Damage	Remarks	
Gia Lam, Storage Area	Probable light damage to civilian buildings	300 yards WSW [REDACTED] Hanoi Railroad Car Repair Shop	25X1A
Hanoi Storage Area	Two civilian buildings moderately damaged	0.2 nm NW of Hanoi Railroad Repair Shop	
Gia Thuy Village	Approximately 12 civilian buildings completely destroyed and 5 civilian buildings lightly damaged	0.2 nm north [REDACTED] Hanoi-Gia Lam Airfield; 0.3 nm east [REDACTED] Hanoi RR Car Repair Shop	25X1A 25X1A
Hanoi, Probable Storage Area	Three civilian buildings destroyed, 7 civilian buildings heavily damaged, 1 civilian building lightly damaged	700 yards, SE [REDACTED] Hanoi RR/Hwy Bridge	25X1A
Yen Vien RR Classification Yard	Approximately 135 civilian buildings destroyed	Adjacent [REDACTED] Yen Vien RR Classification Yard	25X1A
Kinh No RR Classification Yard	Seven civilian buildings destroyed, 1 civilian building heavily damaged, 3 civilian buildings lightly damaged	1,400 yards, SSW [REDACTED] Nguyen Khe POL Products	25X1A
Dan Mo Area, Village and Light Fabrication Plant	Four civilian buildings destroyed	2,600 yards SSW [REDACTED] Nguyen Khe POL Products	
Hanoi Transformer Station	One civilian building destroyed	300 yards, NE of [REDACTED] Hanoi Transformer Station	25X1A
Haiphong, Residential Area 1	Twenty-one buildings destroyed, 3 buildings heavily damaged, 5 buildings lightly damaged	Immediately S of [REDACTED] and [REDACTED] Haiphong Cement Plant and Haiphong TPP West	25X1A 25X1A
Haiphong, Residential Area 2	Six buildings destroyed, 3 buildings heavily damaged, 10 buildings lightly damaged		25X1A
Thai Nguyen	Twenty-seven buildings destroyed, 7 structurally damaged, 3 superficially damaged	Areas adjacent [REDACTED] Thai Nguyen Iron and Steel Complex	

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